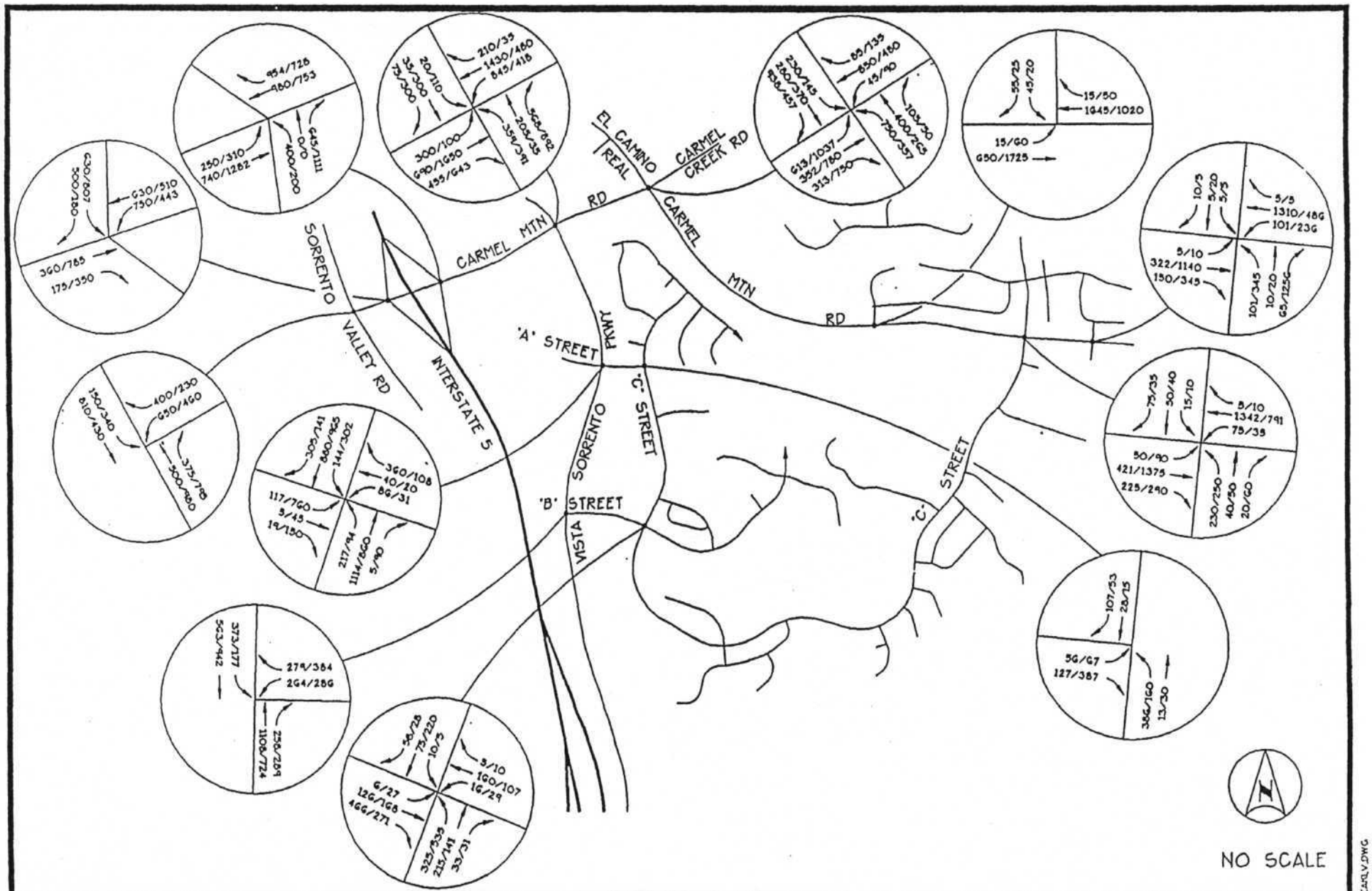


Kimley-Horn and Associates, Inc.

TORREY HILLS

YEAR 2010 AM/PM PEAK HOUR TURNING MOVEMENT VOLUMES

FIGURE 3.2-4

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#### 3.2.4.1 TRAFFIC SIGNAL WARRANT ANALYSIS

The need for traffic signal installation at the Carmel Mountain Road/"HH" Street and "A" Street/"C" Street was analyzed using Caltrans' daily, peak hour and systems warrants. Appendix C contains warrant analysis worksheets documenting this analysis. It was found that daily and peak hour traffic volumes at the "A" Street/"C" Street intersection do not justify installation of traffic signal control. However, the systems warrant is met. At the Carmel Mountain Road/"HH" Street intersection, the morning peak hour warrant is satisfied, but the afternoon and daily warrants are metal as is the systems warrant. Because the Carmel Mountain Road/"HH" Street intersection meets the morning peak hour warrant, a signal is assumed at this location. Although no volume warrants are met at "A" Street/"E" Street, a signal may be desired at this location to regulate flow along the short "A" Street segment between Vista Sorrento Parkway and "C" Street. Signalization should be considered at such time it is warranted by traffic volumes.

## 3.3 ANALYSIS OF LONG-TERM FUTURE TRAFFIC CONDITIONS

### 3.3.1 LEVEL OF SERVICE METHODOLOGY

Level of Service (LOS) is a qualitative measure used to describe the condition of traffic flow and the motorist's perception of roadway performance. LOS is expressed using a letter designation ranging from A to F, with A representing the best operating conditions and F being the worst. Level of Service C is the LOS typically used as a design standard applied to newly developing areas; while LOS D is considered to be an acceptable operating condition by most jurisdictions, including the City of Can Diego. Level of Service C is characterized by stable flow and the point at which maneuverability and speed and motorist comfort and convenience begin to decline noticeably. Level of Service D is an unstable flow condition wherein delays become extensive and the effects of congestion on speed and maneuverability become more noticeable.

### 3.3.2 DAILY ROADWAY SEGMENT CAPACITY ANALYSIS

The forecast daily traffic volumes presented in previously-referenced Figure 3.2-3 were compared the daily roadway segment LOS thresholds established by the City of San Diego for the appropriate street classification. **Table 3.3-1** summarizes the results of this comparison. As shown in this table, all but two street segments are characterized by good LOS C conditions under long-term future conditions. However, these two segments will most likely operate at acceptable levels of service.

"C" Street to the east of "B" Street is expected to have a future traffic volume of 9,000 ADT, which is greater than the LOS C capacity for a two-lane collector with no fronting property (7,500 ADT). However, this roadway is proposed to be constructed as a 50-foot wide roadway to accommodate one travel lane in each direction plus a center turn lane. This cross section, while not in the adopted Street Design Manual, is included in the Draft Street Design Manual with a LOS C capacity of 10,000 ADT.

**TABLE 3.3-1**
**STREET SEGMENT LEVELS OF SERVICE**
**LONG-TERM FUTURE (YEAR 2010) CONDITION**

| STREET | SEGMENT | STREET CLASSIFICATION[1] | DAILY TRAFFIC VOLUME | LEVEL OF SERVICE C VOLUME[2] | LEVEL OF SERVICE |
|---|---|---|---|---|---|
| Carmel Mountain Rd. | I-5 - Vista Sorrento Pkwy. | 6-Lane Prime | 42,000 | 50,000 | C |
| | Vista Sorrento Pkwy. - El Camino Real | 6-Lane Prime | 45,000 | 50,000 | C |
| | West of El Camino Real | 4-Lane Major | 20,000 | 30,000 | B |
| | West of "C" St. | 4-Lane Major | 18,000 | 30,000 | B |
| | East of "C" St. | 4-Lane Major | 20,000 | 30,000 | B |
| Vista Sorrento Parkway | Carmel Mountain Rd. - "A" St. | 4-Lane Major | 21,000 | 30,000 | B |
| | "A" St. - "B" St. | 4-Lane Major | 15,000 | 30,000 | B |
| | South of "B" St. | 4-Lane Major | 27,000 | 30,000 | C |
| "A" Street | Vista Sorrento Pkwy. - "C" St. | 4-Lane Collector[3] | 7,000 | 15,000 | B |
| "B" Street | Vista Sorrento Pkwy. - "C" St. | 4-Lane Collector[3] | 11,000 | 15,000 | C |
| | East of "C" St. | 2-Lane Collector | 1,490 | 7,500 | A |
| "C" Street | "A" St. - "B" St. | 2-Lane Collector[5] | 5,600 | 7,500 | C |
| | | 2-Lane Collector[6] | 5,600 | 10,000 | B |
| | South of "EE" St. | 2-Lane Collector[5] | 9,000 | 7,500 | D |
| | | 2-Lane Collector[6] | 9,000 | 10,000 | C |
| | South of Carmel Mountain Rd. | 4-Lane Collector[3] | 8,000 | 15,000 | C |
| | | 4-Lane Major[4] | 8,000 | 30,000 | A |
| El Camino Real | North of Carmel Mountain Rd. | 6-Lane Major | 22,000 | 40,000 | B |

[1] Community Plan street classification.
[2] Based on City of San Diego traffic volume and level of service standards given in the Traffic Impact Study Manual, August, 1993.
[3] Modified 4-Lane Collector with raised median. Adopted LOS C threshold of 15,000 expected in increase to 20,000 ADT per City research and recommendations in Draft Street Design Manual (6/93).
[4] 4-Lane Major with raised median
[5] With continuous center left turn lane. Classification does not exist in Adopted Street Design Manual.
[6] LOS threshold per Draft Street Design Manual

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### 3.3.3 PEAK HOUR INTERSECTION CAPACITY ANALYSIS

The forecasted peak hour intersection turning movement volumes shown in previously-referenced Figure 3.2-4 were analyzed based on the intersection lane configurations discussed in previous sections. For this analysis, Kimley-Horn used the Highway Capacity Software (HCS) analysis program, release 2 (October, 1994). The City of San Diego requires HCS procedures for analyzing signalized intersections, and this package provides a more accurate estimate of intersection LOS than the Intersection Capacity Utilization (ICU) methodology used in previous studies.

**Table 3.3-2** presents the results of the intersection capacity analysis. As shown in this table, all intersections will be characterized by good LOS C or better conditions during both peak hours analyzed, with the exception of the Carmel Mountain Road/El Camino Real/Carmel Creek Road intersection, which experiences LOS D during both peak hours. (Refer to Appendix C for worksheets documenting this analysis.) Level of Service C is typically considered the minimum performance standard for intersections in newly-developing areas in San Diego, with LOS D being considered where extensive improvements would otherwise be needed. The Carmel Mountain Road/El Camino Real/Carmel Creek Road intersection is a key location because it accommodates trips to I-5 that originate in the Torrey Hills area and in other communities lying to the north and east. It also provides an alternate route for north/south travel bypassing I-5 (i.e., via Vista Sorrento Parkway and El Camino Real.) In addition, many trips to and from the shopping center located east of "C" Street will pass through this intersection. Because of its location, the intersection is expected to have heavy traffic volumes on all four legs, resulting in relatively high peak hour volumes. The "A" Street/"C" Street intersection was analyzed as both a signalized and stop-controlled intersection. It will be characterized by excellent LOS B or better conditions during both peak hours, whether signalized or not.

Appendix D contains excerpts of the September 24, 1994, traffic study depicting peak hour traffic volumes for intersections located south of Torrey Hills.

### 3.3.4 RAMP METERING ANALYSIS

Using procedures outlined by the City of San Diego, the impacts of metering the I-5/Carmel Mountain Road ramps were analyzed. The expected peak hour demand will be southbound in the morning peak hour and northbound in the afternoon peak hour. **Table 3.3-3** presents the results of this analysis. Although the proposed project would add fewer trips to the interchange than the approved plan, and would therefore cause shorter queues and delays than the approved plan, it is assumed that Caltrans would adjust the meter timing at these ramps to balance with demand at other I-15 interchanges. For this reason, a standard delay was assumed and flow rates were adjusted accordingly. As shown in Table 3.3-3, use of standard 15 minute delay for each ramp results in a total 4,725 foot queue in the morning peak hour and a total queue of 5,325 feet in the afternoon peak hour.

TABLE 3.3-2
INTERSECTION LEVEL OF SERVICE
LONG-TERM FUTURE (YEAR 2010) CONDITION

| SIGNALIZED INTERSECTIONS | | | | |
|---|---|---|---|---|
| | AM PEAK HOUR | | PM PEAK HOUR | |
| INTERSECTION | DELAY[1] (sec/veh) | LOS[2] | DELAY[1] (sec/veh) | LOS[2] |
| Carmel Mountain Rd./Sorrento Valley Rd. | 9.5 | B | 12.9 | B |
| Carmel Mountain Rd./I-5 southbound ramps | 12.4 | B | 14.6 | B |
| Carmel Mountain Rd./I-5 northbound ramps | 10.6 | B | 16.2 | C |
| Carmel Mountain Rd./Vista Sorrento Pkwy. | 21.7 | C | 23.5 | C |
| Carmel Mountain Rd./El Camino Real/Carmel Creek Rd. | 35.7 | D | 25.7 | D |
| Carmel Mountain Road/"HH" Street | 6.1 | B | 5.5 | B |
| Carmel Mountain Rd./"C" St. | 13.6 | B | 11.4 | B |
| Carmel Mountain Rd./Shopping Ctr. Access | 11.3 | B | 19.9 | C |
| Vista Sorrento Pkwy./"A" St. | 24.1 | C | 22.7 | C |
| Vista Sorrento Pkwy./"B" | 11.7 | B | 7.8 | B |
| "A" Street/"C" Street (a) | 9.4 | B | 4.5 | A |
| "B" St./"C" St. | 20.9 | C | 25.0 | C |

| UNSIGNALIZED INTERSECTION | | | | |
|---|---|---|---|---|
| | AM PEAK HOUR | | PM PEAK HOUR | |
| INTERSECTION | DELAY[3] (sec/veh) | LOS[4] | DELAY[3] (sec/veh) | LOS[4] |
| "A" St./"C" St. (b) | 3.2 | A | 3.2 | A |

1. Average stopped delay per vehicle in seconds
2. Level of service was determined using methods described in Chapter 9 of the Highway Capacity Manual
3. Average total delay, in seconds
4. Level of service was determined using methods described in Chapter 10 of the Highway Capacity Manual

(a) Assuming signalization
(b) Assuming stop control

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TABLE 3.3-3
RAMP METERING ANALYSIS RESULTS

| LOCATION | PEAK | PROPOSED PROJECT | | | | |
|---|---|---|---|---|---|---|
| | | DEMAND D | FLOW F | EXCESS DEMAND E | DELAY (MIN) | QUEUE Q (FT) |
| I-5/Carmel Mtn. Rd. | AM Southbound | 925 | 736 | 189 | 15 | 4725 |
| I-5 Carmel Mtn. Rd. | PM Northbound | 1038 | 825 | 213 | 15 | 5325 |

D = peak hour demand expected t ouse the on-ramp
F = peak hour capacity to be processed by ramp meter rate
E = D - F
DELAY = (E/F)*60 minutes per hour
Q = E * 25 feet per vehicle

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## 3.4 COMMERCIAL CENTER ACCESS

The proposed commercial center to be located in TAZ 732 will take its primary access via a signalized driveway on Carmel Mountain Road, located east of the Carmel Mountain Road/"C" Street intersection. Since the "C" Street intersection with Carmel Mountain Road has shifted to the west, when compared to its location in the adopted Sorrento Hills Community Plan, spacing between this signal, the proposed shopping center signal and the proposed signal to the east (in the Carmel Valley Community) will be adequate. Secondary access will be provided via a connection to "C" Street south of Carmel Mountain Road. Analysis of forecasted peak hour turning movement volumes exiting the commercial center's signalized driveway on Carmel Mountain Road indicated that the south leg of the intersection should provide the following lane configuration:

- Two northbound left turn lanes
- One shared through/right turn lane

In evaluating the access to this site, driveway rates were used. Retail sites typically have about 40 percent of their driveway trips occurring as pass-by trips with the remaining 60 percent of their driveway trips being "cumulative" trips (i.e., new trips). While the bass-by trips do not impact area-wide facilities, they do have localized impacts on site access points.

## 3.5 SUMMARY OF TRANSPORTATION FACILITY IMPROVEMENTS

**Table 3.5-1** lists the transportation improvements to be required in the project vicinity. A number of the transportation improvements have been constructed or are being constructed. This table was developed based on the findings of the current study for facilities within the Torrey Hills area and on the conclusions of the September 29, 1994, study for facilities located to the south of Torrey Hills.

**TABLE 3.5-1**
**SUMMARY OF TRANSPORTATION IMPROVEMENTS**

| Location | Improvement (a) | Status (1/19/96) |
|---|---|---|
| Carmel Mountain Road | | |
| I-5 - El Camino Real | Construct as six lane primary arterial | Completed |
| El Camino Real - E. Project Boundary | Construct as four lane major | Bonded for but not constructed |
| Vista Sorrento Parkway | | |
| Carmel Mountain Rd. - Sorrento Valley Blvd. | Construct as four lane major | To be bonded for and constructed by project |
| "A" Street | Construct as four lane collector | To be bonded for and constructed by project |
| "B" Street | Construct as four lane collector | To be bonded for and constructed by project |
| "C" Street | | |
| Carmel Mountain Rd. - "GG" St. | Construct as four lane collector | To be bonded for and constructed by project |
| "GG" St. - "A" Street | Construct as two lane collector | To be bonded for and constructed by project |
| Carmel Mountain Rd./Sorrento Valley Rd. | Provide traffic signal | Under construction |
| Carmel Mountain Rd./I-5 southbound ramps | Provide traffic signal | To be provided under Sorrento Hills Development Agreement; secured by letters of credit |
| Carmel Mountain Rd./I-5 northbound ramps | Provide traffic signal | To be provided under Sorrento Hills Development Agreement; secured by letters of credit |
| Carmel Mountain Rd./Vista Sorrento Pkwy. | Provide traffic signal | Constructed |
| Carmel Mountain Rd./El Camino Real/Carmel Creek Rd. | Provide traffic signal | Constructed |
| Carmel Mountain Rd./"Z" Street | Provide traffic signal | To be bonded for and constructed by project |
| Carmel Mountain Rd./"C" Street | Provide traffic signal | To be bonded for and constructed by project |
| Carmel Mountain Rd./Shopping Ctr. Access | Provide traffic signal | To be bonded for and constructed by project |
| Vista Sorrento Pkwy./"A" Street | Provide traffic signal | Constructed |
| Vista Sorrento Pkwy./"B" Street | Provide traffic signal | To be bonded for and constructed by project |
| "B" St./"C" St. | Provide traffic signal | To be bonded for and constructed by project |
| "A" St./"C" St. | Provide traffic signal, when warranted | To be bonded for and constructed by project |
| Vista Sorrento Pkwy./Sorrento Valley Blvd. (b) | Provide traffic signal | Provide traffic signal |
| Sorrento Valley Blvd./Roselle St. (b) | Provide traffic signal | To be bonded for and constructed by project |

(a) Refer to Figure 3.1-2 for intersection lane geometrics

(b) Per Sept. 29, 1994 traffic study

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